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Office Memorandum • UNITED STATES GOVERNMENT

X1 TO : [] Chief, Adm. & Eng. Div. ²⁰⁰⁵ DATE: 28 July 1952
X1 FROM : [] Act. Chief, IRB ²¹⁰¹
SUBJECT: Development of Polygraph Accessory

1. Upon purchase of the Model 302 Keeler Polygraph from Associated Research, Inc., 3758 W. Belmont Avenue, Chicago 18, Illinois, there is furnished therewith an accessory, part #1746 - Electrode Assembly, hand, dry disc type. It has been found that although the technical results attained in actual operation are quite satisfactory there is a resultant loss of efficiency due to mechanical breakdown of the various component parts. The structure of the electrode is such that there is movement at five points within its design. This results in the following faults or breakdown of the accessory:

a. When the hand contact disc is removed or replaced, for or after cleaning, the stem will shear off at the point it enters the shaft, probably due to the brittleness of the materials used.

b. The yoke (holding the disc cup) is soldered to the adapter fitting which in turn is screwed to the arm of the electrode. Due to the constant motion of this yoke, there is considerable failure of the physical joint so formed.

c. Where the yoke adapter (b. above) is screwed to the electrode arm proper, there has been frequent failure of the threads, both male and female.

d. Between the right and left arm, fitted in a bakelite disc, there is a very fine wire pigtail, connected at both ends to either of the arms by a soldered connection. This affords continuity of the circuit from the cable to the hand discs. Because of the constant rotation of the joint (quite necessary to fit the electrode to the hand) there has been numerous occasions of open circuiting due to disconnections or broken pigtails.

Items a, b, c, and d above have caused some loss of time and efficiency since repair of this accessory is of a tedious nature. This accessory purchased separately costs \$36.75.

2. In view of the facts stated above, several experiments were conducted in the construction of a hand electrode that had no moving parts and few points of jointing or connections.

a. Materials were tested for resistance, rate of conductivity and insulating properties so that the current usage would conform to the electrical energies contained in the Wheatstone bridge of the galvanometer circuit.

b. An identical method of fastening the new electrode to the instrument proper was adopted so that no structural change of the mounting panel of the instrument would be necessary.

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X1 c. Exhaustive tests of the new electrode were made by a polygraph operator of this Branch, and several of his ideas and suggestions were adopted and adapted to the electrode. 25X

d. On February 11, 1952, ten such electrodes were made and assembled in this shop and placed into service by all of the operators of this Branch. These tests proved conclusively that the resulting failures were practically eliminated. On a basis of technical performance, the new electrode produced results comparable to those attained with use of the electrodes furnished by the factory.

3. The following materials and sources of supply were used in the construction of the new electrodes. Where purchases are indicated at local outlets such purchases were made by the undersigned without reference to this Agency.

- 1 - Amphenol male connector plugs, radio lug terminals - Sun Radio Company, 938 F Street, NW, Wash., D.C.
- 2 - 1/8" plastic tubing and flatwork (plexiglass) (cut to specifications and cemented) - Kosto Plastics Corp, 2131 Penn. Ave, Wash, D.C.
- 3 - 1-1/8" binding posts, aluminum, medium - Chas. G. Stott, 1310 New York Ave., NW, Wash., D.C.
- 4 - Belden "8411" shielded cable, plastic coated. - Local Agency warehouse
- 5 - 3/4" black elastic, needles, thread, and finger nail polish - G.C. Murphy Co., 1214 G St., NW, Wash., D.C.
- 6 - Resin "5" solder, paste, flux, etc. - Local Agency Warehouse

This electrode was designed, fabricated and tested in the Branch, is made of a plastic shell formed to fit the contour of the hand, having no moving parts, and is more adjustable to sensitivity than the factory-supplied electrode. It is a hand produced electrode that is not purchaseable at any source. It has been found possible to produce the new model in the Branch laboratory for a total cost of \$2.40 each, thus indicating a saving of \$34.35 per unit. Pertinent drawings and photographs are attached.

4. In view of the fact that Associated Research, Inc. of Chicago are now engaging in experimentation in the development of a new type of hand electrode for issue with their Model 302 Polygraph instruments and considering that there may be some patentable rights in our own developments, it is felt that the interest of the Agency and the Government may be best protected by the submission of this report.

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W. M. M.

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